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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/092,949 | 03/08/2002 | Atsushi Umeda | Q68893 | 7381 |

7590 11/20/2002

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EXAMINER

NGUYEN, LAM S

| ART UNIT | PAPER NUMBER |
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2853

DATE MAILED: 11/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/092,949

Applicant(s)

UMEDA ET AL.

Examiner

LAM S NGUYEN

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 16, 21/1-6, 21/16, 22, 23, 26 is/are rejected.
- 7) ☒ Claim(s) 7-15, 17-20, 21/7-15, 21/17-20, 24, 25 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 October 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

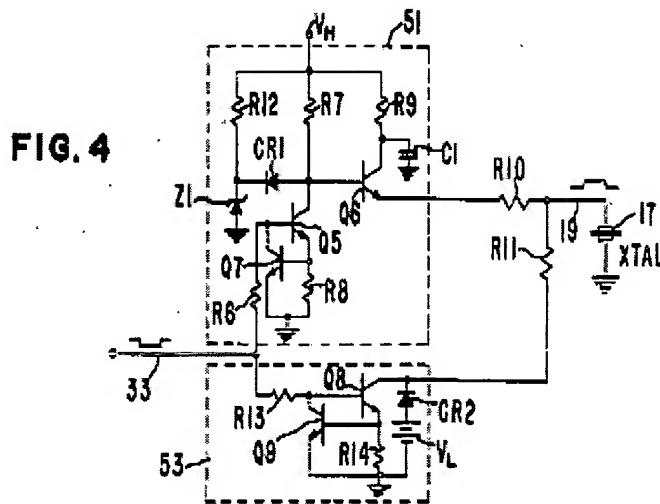
1. Claims 1-6, 21/1-6, 22, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson, Jr. (US 4126867) in view of Osawa et al. (US 6106091).

Stevenson, Jr. discloses a head driving apparatus, incorporated in an ink jet printer which comprises a print head, provided with a plurality of nozzles (FIG. 1, element 23), piezoelectric elements (FIG. 1, element 17), each associated with one of the nozzles and provided with a drive electrode and a common electrode (FIG. 1, element 19), and a head driver, which generates a drive signal for driving the piezoelectric elements, and selectively supplies the drive signal to at least one of the piezoelectric elements to eject an ink droplet from at least one associated nozzle (FIG. 2, element 35), the head driving apparatus comprising.

a bias power source (FIG. 4, element 51).

Referring to claims 3, 21/3: wherein the bias power source is provided as a logic power source (FIG. 4, element 51 operates as a switching circuit).

Referring to claims 4, 21/4: wherein the bias power source generates the bias voltage based on a power supplied from a power source for driving the print head (FIG. 4, element V_H).



Referring to claims 5, 21/5: wherein the bias power source includes a condenser (FIG. 4, element C1), and a constant-voltage circuit (FIG. 4, element Z1), which applies the bias voltage to the condenser.

Referring to claims 6, 21/6: wherein the constant-voltage circuit includes a Zener diode (FIG. 4, element Z1), a current limiting resistance (FIG. 4, element R12) and a coupling element (FIG. 4, elements CR1 and Q6) the Zener diode is electrically connected to the head driving power and source through the current limiting resistance the Zener diode is electrically connected to the common electrode through the coupling element.

Stevenson, Jr does not disclose that the bias voltage having a predetermined potential is applied to the common electrode of each piezoelectric element.

However, Osawa et al. disclose a method of driving inkjet head having a variable bias voltage (FIG. 6, element Pc) (**Referring to claims 2, 21/2**) having a predetermined potential is applied to the common electrode of each piezoelectric element (FIG. 5: the bias voltage Pc is

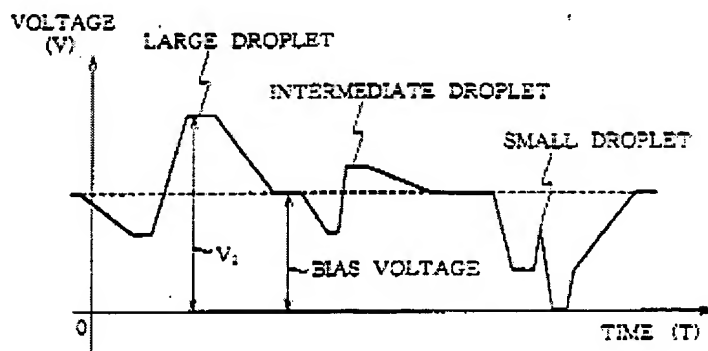
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applied to each piezoelectric 10 through a diode D1) for adjusting a discharge time constant (column 9, line 18-25).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to apply the bias power source as disclosed by Stevenson, Jr. to the common electrode of each piezoelectric as disclosed by Osawa et al. The motivation of doing so is to adjust the discharge time constant to avoid the free oscillation inside the ink chamber that causes the undesired ink ejection in order to gain printing quality as taught by Osawa et al. (column 3, line 15-28).

2. Claim 16, 21/16, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stevenson, Jr. (US 4126867) in view of Osawa et al. (US 6106091) and further in view of Araki (US 6312077).

Stevenson, Jr. and Osawa et al. disclose the claimed invention as discussed above except that wherein the bias power source is provided as a reference voltage generator which applies a reference voltage having a potential which is substantially identical with an intermediate potential of the drive signal, to the common electrode.



Araki the bias power source is provided as a reference voltage generator which applies a reference voltage having a potential which is substantially identical with an intermediate potential of the drive signal (FIG. 11a-b).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to set the voltage of the bias power source as disclosed by Stevenson, Jr. in view of Osawa et al. be substantially identical with an intermediate potential of the drive signal as disclosed by Araki. The motivation of doing so is discharge a fine ink droplet at a high speed, thus improving the image quality as taught by Araki (column 4, line 2-5).

Allowable Subject Matter

3. Claims 7-15, 17-20, 21/7-5, 21/17-20, 24, 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Referring to claims 7, 21/7: The most pertinent arts Stevenson, Jr. (US 4126867), Araki (US 6312077), and Osawa et al. (US 6106091) fail to disclose wherein the constant-voltage circuit includes a discharging diode electrically connected to the head driving power source in parallel with the current limiting resistance, such that a current is flowed to the head driving power source through the discharging diode. Therefore, the claimed invention is not disclosed by the prior arts.

Referring to claims 8, 12, 21/8, 21/12: The most pertinent arts Stevenson, Jr. (US 4126867), Araki (US 6312077), and Osawa et al. (US 6106091) fail to disclose a charger which charges the condenser based on a power supplied from a power source for driving the print head. Therefore, the claimed invention is not disclosed by the prior arts.

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Referring to claims 17, 21/17: The most pertinent arts Stevenson, Jr. (US 4126867), Araki (US 6312077), and Osawa et al. (US 6106091) fail to disclose further comprising the reference voltage generator includes a voltage holder, which latches an arbitrary potential of the drive signal based on the charge signal and an current amplifier, which current-amplifies a voltage output from the voltage holder. Therefore, the claimed invention is not disclosed by the prior arts.

Referring to claims 18, 21/18, 24: The most pertinent arts Stevenson, Jr. (US 4126867), Araki (US 6312077), and Osawa et al. (US 6106091) fail to disclose wherein the reference voltage generator discharges at least one of the piezoelectric elements when a potential of the drive signal is higher than the intermediate potential while a printing operation is performed; and the reference voltage generator charges at least one of the piezoelectric elements when the potential of the drive signal is lower than the intermediate potential while the printing operation is performed. Therefore, the claimed invention is not disclosed by the prior arts.

Referring to claims 9-11, 13-15, 19, 20, 21/9-11, 21/13-15, 21/19, 21/20: Allowable since their dependence on the allowable claims 8, 12, 17, 18, 21/8, 21/12, 21/17, 21/18.

Referring to claim 25: The most pertinent arts Stevenson, Jr. (US 4126867), Araki (US 6312077), and Osawa et al. (US 6106091) fail to disclose further comprising the step of varying a potential of the bias voltage so as to follow a potential of the drive signal when the drive signal is not used for ejecting the ink drops. Therefore, the claimed invention is not disclosed by the prior arts.

Conclusion

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Greve (US 4284996) teaches the static rest condition of a inkjet recording apparatus is set by a bias voltage U_{sv} .

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S NGUYEN whose telephone number is (703)305-3342.


The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, JOHN E BARLOW can be reached on (703)308-3126. The fax phone numbers for the organization where this application or proceeding is assigned are (703)305-3431 for regular communications and (703)305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

LN

November 17, 2002


John Barlow
Supervisory Patent Examiner
Technology Center 2800